Voyager Bulletin

MISSION STATUS REPORT NO. 43 JUNE 5, 1979

VOYAGER 1
January 24, 1979
40 million km (25 million mi)

VOYAGER 2
May 9, 1979
46 million km (29 million mi)

Jupiter is sporting quite a different face than it did just four months ago, as these photos by the two Voyager spacecraft clearly show. Although individual features in the Jovian atmosphere are long-lived, the winds blow at greatly different speeds at various latitudes, causing the clouds to move independently of each other and to change longitudes.

Important changes appear in the region of the Great Red Spot: One of the white ovals has drifted from a position southwest of the Great Red Spot in late January to its present position 60 degrees eastward. Its movement has allowed another feature to move in behind it, from a January position just west of the white oval to a May position directly beneath the GRS. The white oval is drifting east at a rate of about 0.35 degree a day (1.57 miles per hour), while the GRS itself is drifting west at about 0.26 degree a day (1.48 miles per hour).

The bright "tongue" extending upward from the red spot is interacting with a thin, bright cloud above it that has traveled twice around Jupiter in four months. Turbulent wave patterns to the west of the GRS, which have been observed since 1975, appear to be breaking up. This area has undergone three major periods of activity in the last 15 years.

The Voyager 2 photo shows a dark spot which has developed along the northern edge of the dark equatorial region. A similar feature was observed by Pioneer 10 in December, 1973. Dark spots in the northern latitudes in the Voyager 1 photo are still present. These spots are thought to be holes in the upper cloud decks penetrating into the warmer lower cloud layers.

Ganymede is visible at the lower left of the Voyager 1 photo.

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Space Administration

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VOYAGER 2: JUPITER MINUS 34 DAYS
VOYAGER 1: SATURN MINUS 525 DAYS

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Status Bulletin Editor (213) 354-4438
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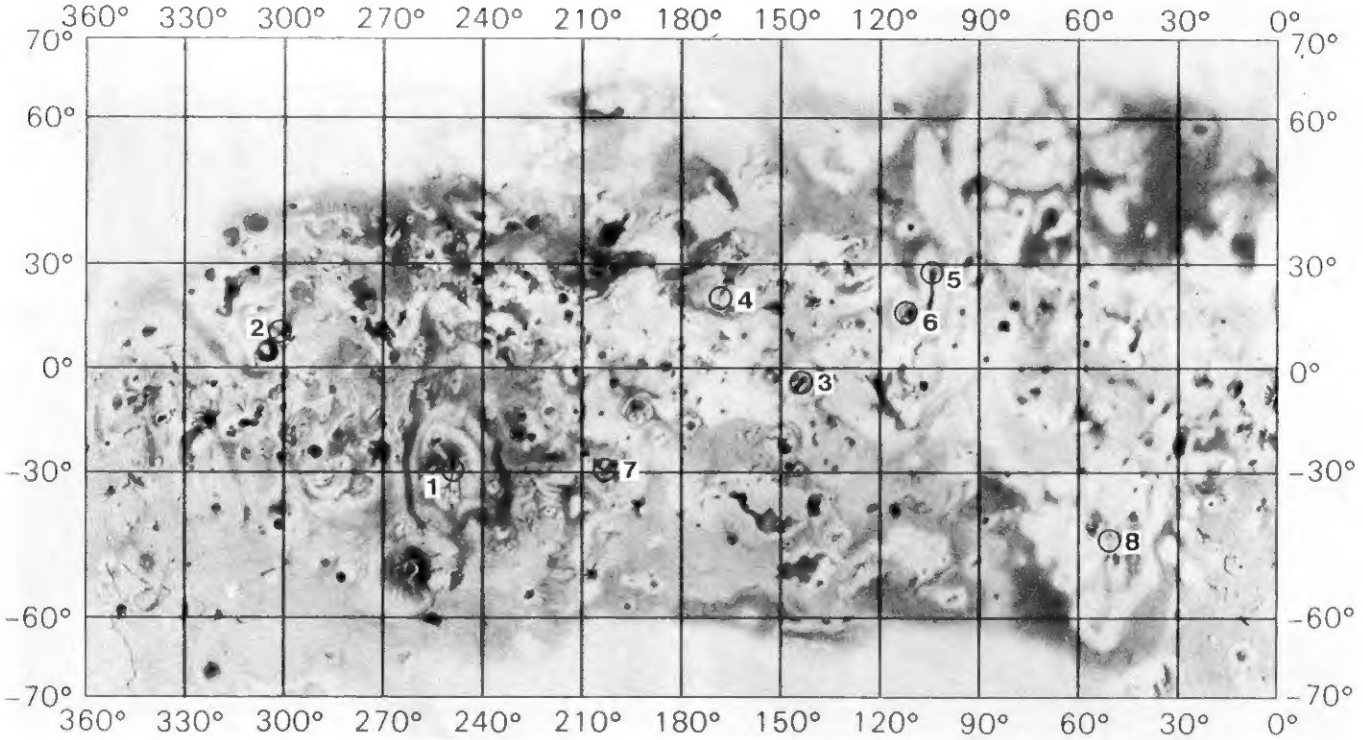


MERCATOR PROJECTIONS — Preliminary shaded relief maps of the Galilean satellites have been prepared from images taken during Voyager 1's flight through the Jovian system. The scale here is 1:100 million (1 cm = 1000 km). Io shows a complex system of calderas, flows, and volcanic features. Featureless, smooth plains lie between the volcanic regions. The plumes of eight active volcanoes identified to date are indicated by arrows.

Mission Highlights

Thirty-four days from its closest approach to Jupiter, Voyager 2 is operating smoothly with only a few special concerns. Heating in one section of the buss (the spacecraft's main body) causes frequency drifts in the ship's remaining radio receiver (the primary receiver and a tracking loop capacitor on the remaining receiver failed in April, 1978). The frequency drifts limit routine commanding. Such heating occurs primarily when the spacecraft is maneuvered off the sun line (as in special tests or calibrations, or maneuvers) or when the spacecraft power consumption changes. Events likely to cause temperature increases have been identified and plans for commanding during these periods have been revised.

Final target selection for the imaging, ultraviolet, and infrared experiments has been completed and the computer sequences are being finished to be relayed to the spacecraft before the near encounter period (July 8-9). Some planned observations have had to be simplified due to the space occupied in the processor by the backup mission load (BML). The BML is designed to automatically operate the spacecraft (although at a reduced activity level) through a Saturn encounter in August, 1981 should the remaining receiver fail. In that event, the spacecraft would not be able to receive radio signals from Earth, but could still transmit data to Earth.)

The photopolarimeter instrument will not operate the polarization wheel due to sticking problems similar to those on Voyager 1's instrument. Near ultraviolet photometry of Jupiter and Ganymede will be obtained, however, as well as a multi-color study of Io's ion torus.

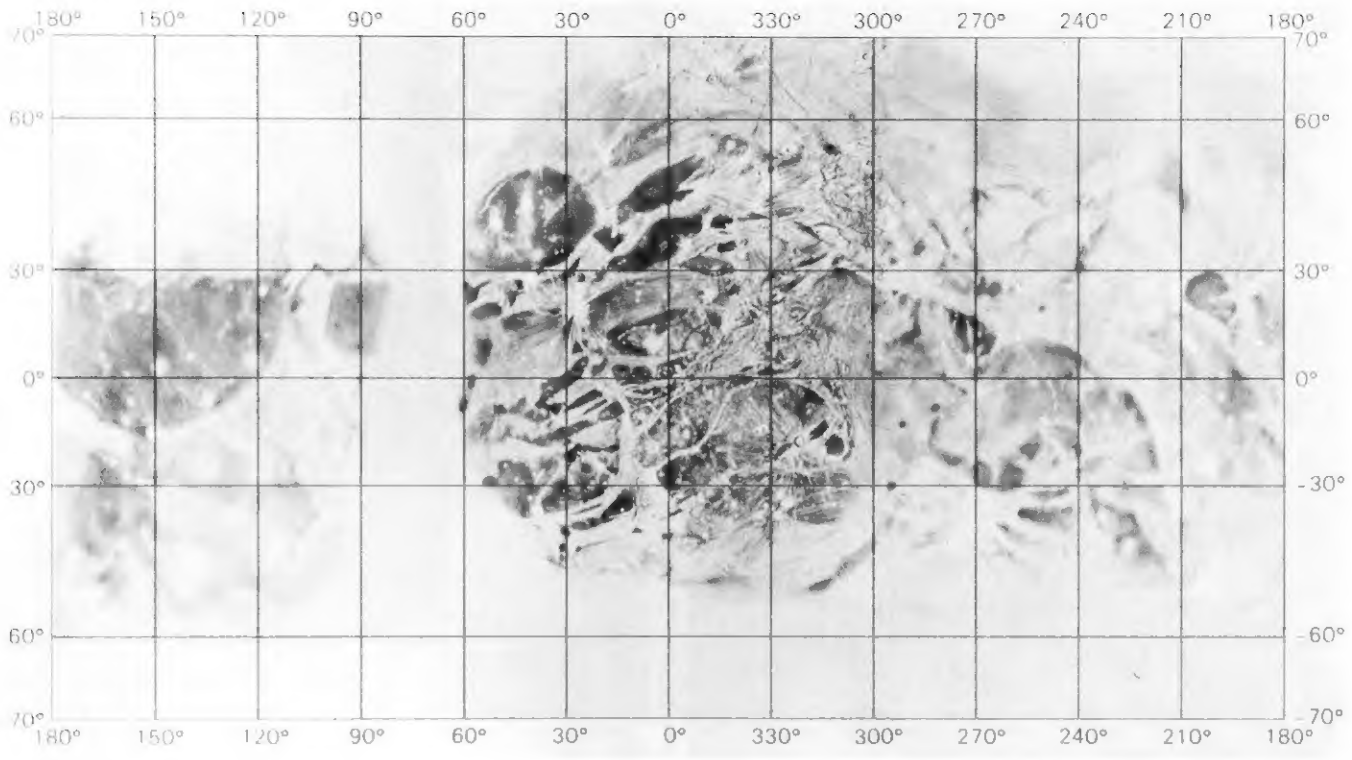
The infrared interferometer spectrometer and radiometer (IRIS) is in a long heating cycle scheduled to end about June 20. The heating was required to preserve instrument performance due to degradation of a bonding material in the motor. The degradation could cause the mirror alignments to be off just fractions of a wavelength of light, but even 0.001 cm (0.00005 in.) would be enough to affect the quality of the data.

Imaging

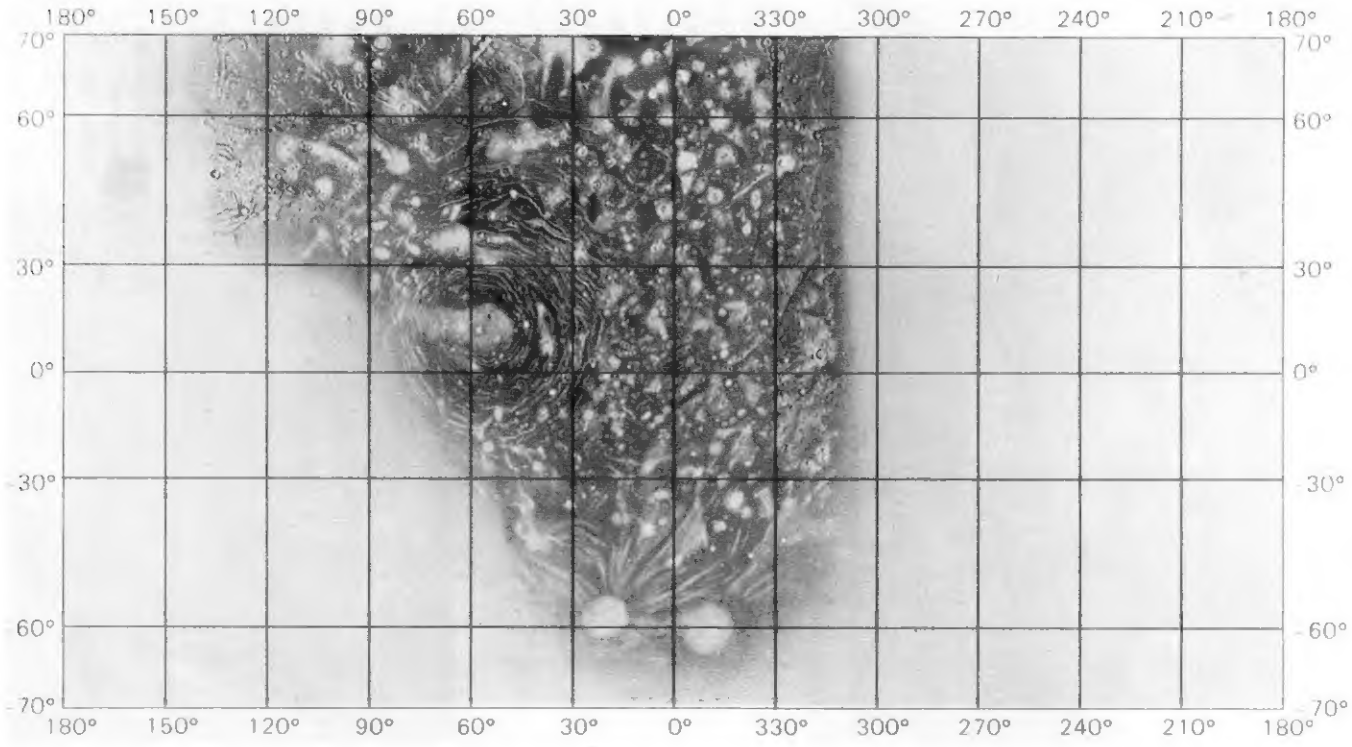
Voyager 2 is now mosaicking the disk of Jupiter, taking a set of 12 narrow angle and 2 wide angle frames once an hour to ensure full coverage of the planet.

An "approach zoom" movie showing changes at the Great Red Spot since Voyager 1's flyby is now being assembled from images taken during the past four weeks as the spacecraft "zoomed" closer to the planet.

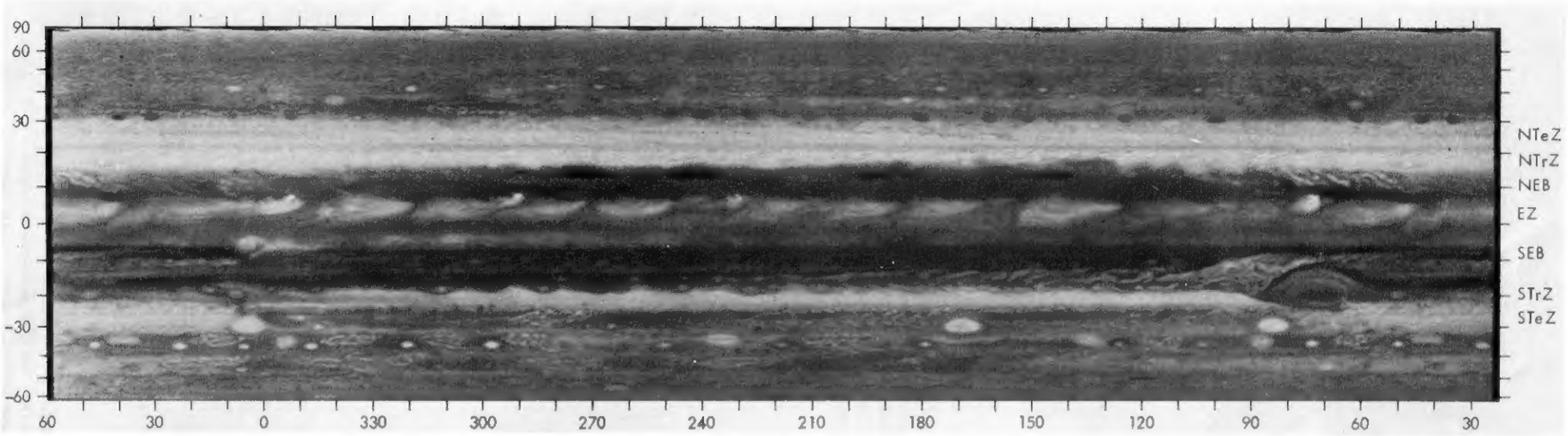
Fifty hours of nearly continuous picture-taking from May 27 to May 29 covered five rotations of Jupiter and will supplement Voyager 1's color movie of ten rotations made last January. The ultraviolet spectrometer experiment will also use the frames to search for auroral activity on the planet.



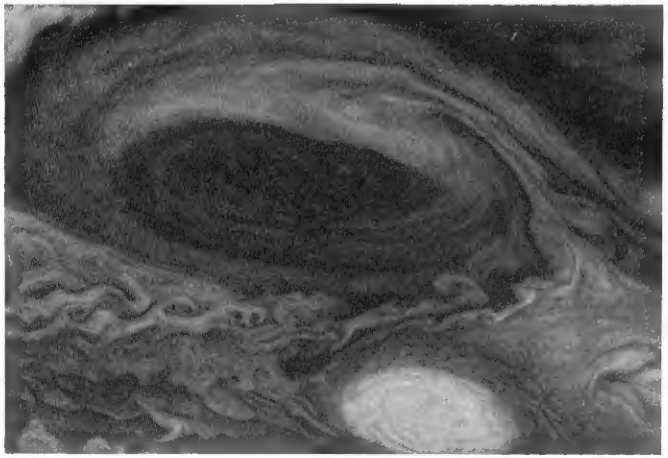
GANYMEDE — An older, cratered terrain is criss-crossed by a younger system of grooves which divide Ganymede's surface into features as large as 1000 km across. The grooves may have resulted from faulting or surface expansion, while the absence of larger craters or mountains on Ganymede suggests an icy crust which collapses under the weight of heavier features.



CALLISTO — More heavily cratered than the other Galileans, Callisto has no grooved terrain as does Ganymede, suggesting that their crusts have evolved very differently. The large multi-ring structure centered at about +10° latitude, 60° longitude, has no central basin, ring mountains, or radial ejecta.



CYLINDRICAL JUPITER — This computer-generated map was made from 10 color images of Jupiter taken February 1, 1979, by Voyager 1, during a single, 10-hour rotation of the planet. Computers at the Jet Propulsion Laboratory's Image Processing Lab then turned the photos into this cylindrical projection. Such a projection is invaluable as an instantaneous view of the entire planet. Along the northern edge of the north equatorial belt (NEB) are four dark-brown, oblong regions believed by some scientists to be openings in the more colorful upper cloud decks, allowing the darker clouds beneath to be seen. The broad equatorial zone (EZ) is dominated by a series of plumes, possibly regions of intense convective activity, encircling the entire planet. In the southern hemisphere the Great Red Spot is located at about 75 degrees longitude. South of the Great Red Spot in the south temperate zone (STeZ) three large white ovals, seen from Earth-based observatories for the past few decades, are located at 5 degrees, 85 degrees and 170 degrees longitude. Resolution in this map is 375 miles (600 kilometers). Since Jupiter's atmospheric features drift around the planet, longitude is based on the orientation of the planet's magnetic field. Symbols at right edge of photo denote major atmospheric features (dark belts and light zones): NTeZ — north temperature zone; NTrZ — north tropical zone; NEB — north equatorial belt; EZ — equatorial zone; SEB — south equatorial belt; STrZ — south tropical zone; and STeZ — south temperate zone.



COLOR ENHANCEMENT — Voyager's color photographs are actually composites of at least three exposures taken through different filters. The photo at left shows "normal" color, while the photo at right has been "color-enhanced" emphasizing red and blue to make some features stand out. Some bizarre and beautiful pictures result from color enhancement techniques. In this view, the Great Red Spot and a white oval with a wake of counter-rotating vortices extend about 24,000 km (15,000 mi) from the top to the bottom of the frame. Puffy features inside the GRS and "reverse-S" spirals inside both the GRS and white oval are visible. The Great Red Spot appears to be one of the coldest areas on the planet, while the white ovals are also cold.